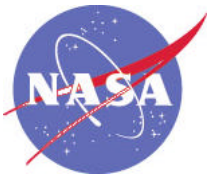
MISSION SERVICES PROGRAM OFFICE

Space Network Access System (SNAS) Operations Concept Document

Original

Publication Date: February 2004

Expiration Date: February 2009



National Aeronautics and Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

This page intentionally left blank.

Space Network Access System (SNAS)
Operations Concept Document

Original

February 2004

Initiated by:

E. Joseph Stevens Date
SNAS Product Design Lead
Code 565, Electrical Systems Branch

Approved by:

Keiji K. Tasaki Date
Project Manager
Code 452, Space Network Project

Goddard Space Flight Center

Greenbelt, Maryland

This page intentionally left blank.

Change Information Page

List of Effective Pages	
Page Number	**Issue**
All	Original

Document History			
Document Number	**Status/Issue**	**Publication Date**	**CCR Number**
452-OCD-SNAS	Original	February 2004	450/_____

This page intentionally left blank.

DCN Control Sheet

DCN Number	Date/Time Group (Electronic DCN Only)	Month/Year	Section(s) Affected	Initials

This page intentionally left blank.

Preface

The purpose of this document is to provide the operations concept for the Space Network Access System (SNAS).

This document is under the configuration management of the Goddard Space Flight Center (GSFC) Mission Services Program (MSP) Space Network (SN) Project (Code 452) Configuration Control Board (CCB). Configuration Change Requests (CCRs) to this document shall be submitted to the SN Project CCB, along with supportive material justifying the proposed change. Changes to this document shall be made by document change notice (DCN) or by complete revision.

Direct all comments, questions, or suggestions regarding this document to:

SNAS Product Design Lead
Code 452, Space Network Project
Goddard Space Flight Center
Greenbelt, Maryland 20771

This page intentionally left blank.

Contents

List of Figures

List of Tables

Section 1. Introduction

1.1 Purpose

The purpose of this Space Network Access System (SNAS) Operations Concept Document (OCD) is to describe the operational characteristics of SNAS. The SNAS provides customers with a network interface to the Network Control Center Data System (NCCDS), located in the Data Services Management Center (DSMC), or to the Demand Access System (DAS), for the purpose of planning, scheduling, monitoring and controlling SN services.

Systems currently available to SN customers for scheduling are the User Planning System (UPS) and the SN Web Services Interface (SWSI). The UPS offers a full set of features and tools for non-DAS SN customers. The SWSI provides a simple low-cost network-based option for SN customers who want the quick turn-around scheduling flexibility. The SWSI provides the functionality required for DAS customers as well as basic scheduling functions for all NCCDS SN services.

SNAS provides SN customers with a network-based, cross-platform system that incorporates most features from both the UPS and SWSI. Customers will be able to schedule SN support just prior to the requested period and also have support tools for ease in scheduling for long-term planning. SNAS will replace the UPS and SWSI as the premier customer access system for managing TDRSS resources. As a result, the SN will provide a single, flexible tool to the customer that is capable of supporting the diverse needs of the space network community.

1.2 Scope

This document describes the operational characteristics of the SNAS, its operating environment, its external interfaces, and the data flow through these interfaces. It also identifies the SNAS security, maintenance, staffing, and training.

1.3 Background

The interface between an SN customer Mission Operations Center (MOC) and the NCCDS consist of electronically exchanged formatted messages. Customers have traditionally had a limited number of hardware options for implementing this interface. A full-featured SN scheduling tool for Single Access (SA) and Multiple Access (MA) services is provided by the UPS, which runs on a Hewlett-Packard (HP) UNIX host. This option required the customer to purchase a complete hardware system at a significant cost or to use a customer interface with an institutional UPS located within the Goddard Space Flight Center (GSFC) Multi-satellite Operations Control Center (MSOCC). A National Aeronautics and Space Administration (NASA) Integrated Services Network (NISN) Closed Internet Protocol (IP) Operational Network (IONet) connection is required for the GSFC-based UPS option.

The DAS, now available, allows an increased number of customers to utilize the SN's Multiple Access Return (MAR) service, scheduling with a significantly reduced lead-time. The UPS system does not allow customers to schedule the DAS. SWSI, a network-based cross-platform customer interface to the NCCDS, provides customers with an interface to the DAS at a low cost. SWSI is available via a desktop computer or workstation without the cost of a custom implementation, and provides access either from the NISN Closed IONet or the NISN Open IONet. Since the Open IONet allows access from other networks such as the NASA Science Internet and from the public Internet, SWSI is accessible by NASA's university, enterprise, and inter/intra-agency partners.

SNAS brings together the most useful features of the UPS along with the real-time features and DAS functionality of SWSI, thus rendering both systems obsolete. The network portion of SNAS (the servers and server software) will be installed and operated within the DSMC. The SNAS is intended to be the single SN access system offered to potential and existing SN customers as the standard interface to obtain and control SN services. Existing customers with unique SN interface systems, however, will not be precluded from continuing to use their current systems.

Section 2. Documents

2.1 Applicable Documents

The following documents are part of this operations concept document to the extent cited therein. The most recent version of these documents takes precedence. If there are conflicts between the listed documents and this operations concept documentation, the SNAS SRD takes precedence. If no section number is shown, the whole document applies.

	Document Number	Document Title
a.	452-SRD-SNAS	Space Network Access System (SNAS) System Requirements Document
	452-ICD-DAS/SNAS	Interface Control Document Between the Demand Access System and the Space Network Access System
	452-ICD-SN/CSM	Interface Control Document between the Space Network and Customers for Service Management

2.2 Reference Documents

The following documents are for reference only. They provide insight into the operation, characteristics, and interfaces of the TDRSS as related to SNAS. The most recent version of these documents takes precedence.

	Document Number	Document Title
a.	452-SP-SNAS	Security Plan for Space Network Access System
b.	530-SRD-NCCDS	Network Control Center Data System (NCCDS) System Requirements
c.	450-SNUG	Space Network Users' Guide (SNUG)
d.	453-OCD-DAS	Demand Access System Operations Concept Document
e.	N/A	DAS Ground Rules, November 2003
f.	NPR 2810.1	NASA Procedural Requirements for Security of Information Technology - Mission (MSN) category of NASA information
g.	GPG 2810.1	Goddard Procedures and Guidelines for Security of

		Information Technology
h.		White Sands Complex (WSC) Data Services Management Center (DSMC) Security Plan
i.	290-003	IP Operational Network (IONet) Security Plan
j.	290-004.	IP Operational Network (IONet) Access Protection Policy and Requirements

Section 3. Reference Architecture

3.1 Reference Documents

Figure 3-1 depicts the SNAS reference architecture. The SNAS subsystems consist of clients, servers, and the SNAS databases as described herein. The SNAS includes both servers on the Open IONet and the Closed IONet. SNAS clients on the Open IONet and the Internet are indirectly provided service by the SNAS servers on the Closed IONet via the secure gateway. The SNAS has prime and backup servers.

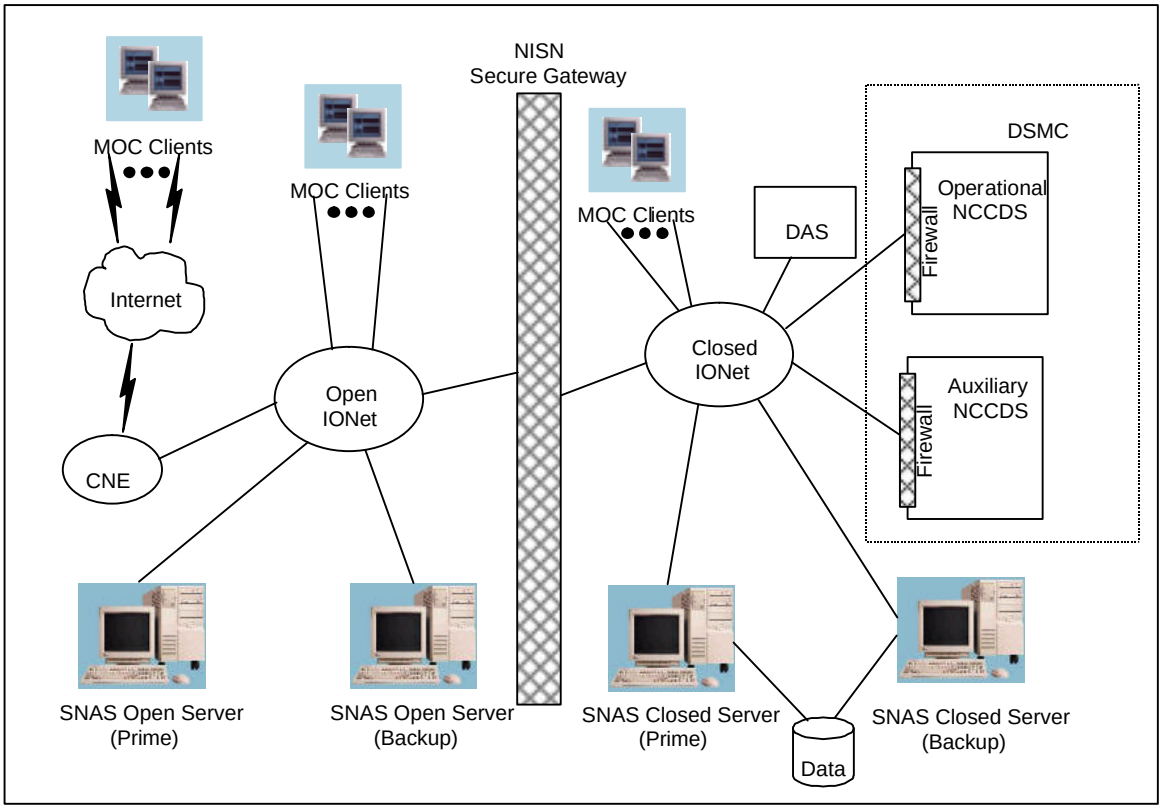


Figure 3-1. SNAS Reference Architecture

3.2 SNAS Reference Architecture Description

3.2.1 Client

Depicted in the reference architecture, Figure 3-1, as MOCs, the SNAS client workstation is the platform provided by the customer, and includes the hardware and software necessary to host the client software. The client software provides customers with access to the SN via the Open or Closed SNAS servers. The client software is considered part of the SNAS product.

The Client has total control over client data that resides on their host machine. Client data includes, for example; log files, active schedule, vector files, UPD logs, etc. No client application is allowed to delete anything from the SNAS database. Limited control of their data residing on the SNAS servers is via the client, however full control is via the WSC operators. This is a security precaution. Automatic purging should be coordinated with the WSC SNAS Database Administrator (DBA).

The Client Lead Userid is referred to as the Mission Manager account. The Mission Manager does not have control of the client userids and passwords. This is a SNAS server DBA function. Accounts are managed from WSC. SNAS has only individual accounts. More than one authorized person can log into SNAS at the same time for a single mission. Group log-ins are prohibited by NPR 2810.1.

The SNAS client will be designed and is envisioned to be up all of the time and runs on the MOC host. The MOC operator or host can lock the terminal after initiating operations or after a timeout.

SNAS will provide the software client “hooks” for automatic control of the MOC host, if desired. SNAS non-interactive modes of operation will be studied further and documented at a later date. This may provide the needed system compatibilities to allow ‘remote control’ of the client to help with transition to unattended MOC operations.

3.2.2 Servers

The servers will act as proxies to route requests from the client to the NCCDS and/or the DAS and return responses to the client, establishing and maintaining all the Transmission Control Protocol (TCP) connections required for the connections. Traffic between the servers on the Open and Closed IONet passes through the NISN gateway.

3.2.3 Database

The database will operate on the SNAS Closed Servers. Database tables will hold static data, semi-static data and dynamically updated data. The static tables will store data that is rarely changed like Tracking and Data Relay Satellite (TDRS) names, Spacecraft Identification Code (SIC) and Support Identifier (SUPIDEN) values. The data in the static table will be used for building display panels and for processing NCCDS or DAS messages. SNAS customers will be assigned access privileges depending upon their roles. The customer will not have direct access to the SNAS server dB. Regardless of the database application used, MOCs will not be allowed to create/issue/send SQL commands to the SNAS server database. However, the SNAS client is

envisioned to have the capability to edit the SSC's which are stored on the SNAS sever dB. There will be no limit to the number of SIC I.D's that SNAS will support.

3.2.4 Connection Management of SNAS Components

Connection management of the LANs within SNAS is described below.

A SNAS Client to SNAS Server network connection is identified uniquely by several parameters: userid/username (logged-in), SNAS Client IP Address, SNAS Server port number, and user selectable operating mode (Ops: NCC/DAS, Engineering Interface (EIF): ANCC/DAS).

SICs are assigned to userids; so one SNAS Client can control multiple SICs.

If several LANs exist within a MOC and are actual physical networks where the IP address subnets are different for each LAN, then a separate SNAS Client would need to be run from a workstation located on each of the LANs. Each of these workstations running the SNAS Client could have access to the NCC or ANCC for a particular spacecraft (i.e. SIC).

The SNAS servers maintain and manage the connectivity to the NCC and ANCC independent of the SNAS Client operation. The SNAS Client has no control over this connectivity. Configuration and control of the NCC and ANCC connections are managed by the WSC SNAS Operations personnel.

One instance (or invocation) of the SNAS Client can support only the NCC/DAS or ANCC/DAS connection. The SNAS Client does not support simultaneous interaction with the NCC and ANCC for a given instance. Each instance of the Client can support only one operation mode: Ops or EIF.

However, each instance of the SNAS Client can be configured to support Planning & Scheduling only, Real-Time only, or both.

This page intentionally left blank

Section 4. System Description

The SNAS provides SN customers with an interface allowing them access to the SN for scheduling and monitoring of their mission. It provides an interactive SN interface for scheduling their services, real-time monitoring of their services and real-time control during active events.

4.1 Validation and Verification Activities

SNAS ensures that customers are only able to access messages and data for which they are authorized. Initial validation and verification activities are provided. SNAS performs basic verification functions such as data type validation and boundary checking. It also performs basic scheduling and service request parameter validation to ensure that all required fields have been entered.

If an error is detected by the SNAS during verification and validation of the service request, SNAS sends an error message and allows the customer to correct the error and continue.

4.2 Service Request Processing

The SNAS supports multiple local or remote secure connections to the NCCDS and DAS. The customer can simultaneously access both the operational NCCDS and the Auxiliary NCCDS for performing EIF testing via SNAS. Additionally, the SNAS allows access to both the operational DAS at WSC as well as the DAS Testbed in the DAS Hardware Maintenance Depot (HMD). The DAS Testbed has limited capabilities for testing. However, either the operational or testbed system can be made accessible, on an as needed basis, for performing EIF tests.

4.2.1 Client Functions

The SNAS system allows customers access to certain Client functions. They may store Return Channel Time Delay Messages (RCTDM) and Time Transfer Messages (TTM) received from the NCCDS in binary files on the customer workstation for later processing by customer applications. SNAS generates Type 1 (orbiting) and Type 8 (stationary) state vectors based on customer entry of latitude, longitude, and altitude or position and velocity and forwards them to NCCDS and/or DAS, depending on which system(s) is used to support that customer platform. SNAS allows customers to import state vectors and to forward them to NCCDS and/or DAS. Additionally, SNAS will provide the capability to display and/or retransmit previously transmitted IIRVs. Customers may also directly enter IIRVs. It provides a means to view alerts or messages when operational abnormalities are detected in SN Scheduling Function resources. [Note: Since the SNAS client is required to be cross-platform compatible, binary files will be stored in the host platform's native format.]

4.2.2 NCCDS and DAS Functions

SNAS is set up to support either NCCDS or DAS customers or customers that need service from both. All functions currently provided to SWSI and UPS customers are available with SNAS. SNAS also provides additional services and enhanced services. SNAS will not provide conflict resolution between NCCDS and DAS services. There is, however, a SNAS requirement specifying that SNAS displays provide an option of selecting NCCDS services concurrently with DAS services. The customer can then perform his/her own conflict resolution.

4.2.3 Database Functions

The SNAS provides a database management capability for all SNAS data. Data entry, data deletion, data update, and data display features are available. Customers may create, modify, and display data forms and data reports. They may make queries and examine data in either form, or file formats. Both static and dynamic data is stored. Data may be imported or exported. The entire database can be backed up and restored. SNAS customers may also deposit and query data. For each SIC, the SNAS partitions data such that some of the data for that SIC can be entered, deleted, or modified only by authorized SNAS administrative personnel while the remainder of the data for that SIC can be entered, deleted, or modified by SNAS client customers authorized for the SIC. In general, privileges related to entry, deletion, or modification of relatively static data such as service specification codes (SSCs) will be restricted to authorized SNAS administrative personnel while privileges related to entry, deletion, or modification of time-dependent data such as schedule requests will be restricted to SNAS client customers. The SNAS provides SNAS client customers with the capability to access the contents of client log files containing data for which the customer is authorized. The customer will not have direct access to the SNAS server dB. However, the SNAS client is envisioned to have the capability to edit the SSC's which are stored on the SNAS server dB.

For each SIC supported by the SNAS, the SNAS provides authorized SNAS administrative personnel with the capability to create and maintain all customer data necessary to interact with the NCCDS/DAS. In particular, this will include a set of SSCs, corresponding to the set maintained for the customer in the NCCDS database, defining the default service configurations for the SIC. For each SIC, the SNAS is capable of retaining a minimum of 10 SSCs. There will be no limit to the number of SIC I.D's that SNAS will support. SNAS will have the capability to store data for a minimum of a total of 100 SIC platforms to include up to 250 clients.

The SNAS maintains a list of valid SUPIDENs for each SIC and the customer may review and reference this data in the process of entering requests. More than one SNAS Client may be authorized for a SUPIDEN/SIC.

SNAS has the requirement to ensure that the capability will exist for SNAS to automatically synchronize to the NCCDS database.

4.2.4 Logging Functions

The SNAS logs and delogs incoming external messages and outgoing external messages. Alerts sent to SNAS clients are logged as are several types of records: Records pertaining to the

establishment and termination of communications connections; Records pertaining to SNAS system failures; Records pertaining to SNAS database failures; Records pertaining to successful SNAS logon attempts and Records pertaining to rejected SNAS logon attempts. The SNAS customer may selectively control delogging of all of the above data for which he/she is authorized.

4.3 System Performance

The SNAS has the capability to store data for a minimum of 100 customer platforms to include up to 250 clients. There will be no limit to the number of SIC I.D's that SNAS will support. It allocates resources for one set of operational data and for at least one set of test data for each platform. For any combination of Internet, Open IONet and Closed IONet SNAS clients, the SNAS servers are capable of supporting simultaneous connections with a minimum of fifty SNAS clients.

In general, actual SNAS response times depend on factors that are beyond the control of the SNAS product. Response times are dependent on delays due to factors such as IONet traffic volume and the performance of the SNAS client infrastructure. However, for interactions initiated from the SNAS client that require a response time from the NCCDS or DAS, the time from receipt of a client request to the time the request is issued to the NCCDS or DAS will not exceed 10 seconds. For interactions initiated from the SNAS client that require simple retrieval of data from the SNAS database, the time from receipt of a client request to the time the request is issued to the NCCDS or DAS will not exceed 10 seconds. Note "Simple retrieval" applies to an action such as retrieving a single scheduled SN event. It does not apply to a complex action such as retrieval of an entire schedule.

This page intentionally left blank.

Section 5. System Interfaces and Supporting Elements

The SNAS interfaces include the SNAS Client Workstation, the IONet Secure Gateway, the DSMC (NCCDS/ANCC), and the DAS (operational system/testbed). These interfaces are described below.

5.1 SNAS Client Workstation

For any combination of Internet, Open IONet and Closed IONet SNAS client customers, the SNAS server is capable of supporting simultaneous connections with multiple SNAS clients. (Note: The SNAS Client Workstation is not part of the SNAS product and is therefore regarded as an external interface requirement.) The workstation platform may be any type of personal computer (PC) or workstation that can access the Internet and/or Closed IONet and that can run Sun Microsystems Java Virtual Machine.

5.2 IONet Secure Gateway

All communication between the SNAS Open Server and the SNAS Closed Server is channeled through the IONet Secure Gateway. When communicating with each other, the SNAS Open Server and the SNAS Closed Server employs protocols or communications techniques that will be acceptable by the IONet Secure Gateway. In response to SNAS configuration changes such as the addition or removal of SNAS customers, the SNAS ensures that it will be compatible with the IONet Secure Gateway.

5.3 Data Services Management Center

5.3.1 General

The DSMC, located at the WSC, contains both the Operational NCCDS and the Auxiliary NCCDS (ANCC). The message flow between the SNAS and the ANCC is exactly the same as that between the SNAS and the Operational NCCDS. Communications between the SNAS and the NCCDS are defined in 452-ICD-SN/CSM. This ICD covers communications protocols and message formats adhered to by SNAS in support of SN Customers scheduling through the NCCDS.

5.3.2 Operations

For any SNAS client at any time, the SNAS is capable of communicating with either the NCCDS located in the operational NCC environment or with the NCCDS located in the ANCC. SNAS is capable of simultaneous communication with both the operational NCCDS for some clients and with the ANCC's NCCDS for other clients

5.3.3 Transmission Protocols

The SNAS employs hypertext transfer protocol (HTTP) to retrieve TDRSS Unscheduled Time (TUT) information from the NCCDS. The SNAS otherwise employs Transmission Control Protocol/Internet Protocol (TCP/IP) for all other communications with the NCCDS. The SNAS will not use Nascom 4800 Bit Block (BB) protocol or File Transfer Protocol (FTP) for any of its communications with the NCCDS.

5.3.4 Communications Messages

As needed, the SNAS establishes communications connections with NCCDS services and automatically transmits any messages needed to configure the services to the NCCDS.

5.4 Demand Access System

SNAS accepts customer requests for scheduling of the DAS. All communications between the SNAS and the DAS are specified in the Interface Control Document between the Demand Access System and the Space Network Access System, 452-ICD-DAS/SNAS. This ICD contains the details of the communications protocols, security protocols, and detailed message formats to meet the interface requirements between the DAS and SNAS systems. It documents the message organization structure and, at a high-level, the description of information that is contained within the messages exchanged between DAS and SNAS.

Section 6. Operational Characteristics

Customers interact with SNAS via the Internet, the Open IONet or the Closed IONet. Customers may be NCCDS customers or DAS customers or both.

6.1 NCCDS Customer Interactions

SNAS allows customers requiring NCCDS services the capability to interactively request the full compliment of existing NCCDS services as defined in the Interface Control Document between the Space Network and Customers for Service Management, 452-ICD-SN/CSM. For the type of request submitted by the customer, the SNAS allows the customer the capability to use all valid options associated with the request.

6.2 NCCDS Customer Services

NCCDS service messages such as Schedule Add Request (SARs), Schedule Delete Request (SDRs), Schedule Result Requests (SRRs), Alternate Schedule Add Requests (ASARs), as defined in the Interface Control Document Between the Space Network and Customers for Service Management, 452-ICD-SN/CSM, may be scheduled through SNAS. TDRS Service Windows (TSWs) and TUTs are also available as scheduling aids. Closed IONet customers may access TUTs directly from the NCCDS. SNAS provides access to TSWs and TUTs for Internet and Open IONet customers.

SNAS will provide the customer with the capability to generate a series of SARS and associated ASARS controlled by a user-defined pattern containing schedule request prototypes and based on confirmed events, TSW information, and TUT information.

Upon login, customers will specify their desired SUPIDEN which may be one of several of which they are authorized to used. More than one customer client may be authorized for the same SUPIDEN/SIC combination. Upon completion of entry of a service request, the SNAS formats, stores and transmits the request in accordance with the formats defined in 452-ICD-SN/CSM. For the type of request submitted by the customer, the SNAS allows the customer the capability to use all valid options associated with the request.

In response to schedule requests, the NCCDS will reply with Schedule Request Messages (SRMs) and User Schedule Messages as defined in 452-ICD-SN/CSM, thus notifying the customer of the status of their schedule request.

Service Reconfigurations are implemented using Ground Control Message Requests (GCMRs) via SNAS. The SNAS provides the Customer the capability to enter User Reacquisition Requests, User Reconfiguration Requests, Forward Link Sweep Requests, Forward Link EIRP requests, Expanded User Frequency Uncertainty Requests, and Doppler Compensation Inhibit Requests. Upon completion of entry of a service reconfiguration request, the SNAS formats, stores and transmits the request in accordance with the formats defined in 452-ICD-SN/CSM.

For the type of request submitted by the customer, the SNAS allows the customer the capability to use all valid options associated with the reconfiguration request.

When a service request has been successfully created, SNAS notifies the customer. The SNAS provides reporting capabilities, including reports of requested events, confirmed schedules, confirmed events, and activity logs. Additionally, SNAS provides the capability for the customer to create and update their data in the system database. The customer can also modify what data is displayed.

Current active service displays are provided to the Customer for their review. At service start time, displays reflect the service initial state. Upon successful service reconfiguration request, the displays are updated and status messages are sent to the Customer.

If customer performance data is enabled, the SNAS displays the data to the customer as it is received from the NCCDS. The SNAS receives user performance data for each active service with ongoing NCCDS support.

NCCDS Alerts are displayed via SNAS. Upon receipt of an alert, SNAS alerts the customer implied by the SIC specified in the alert message and makes the text of the alert message available for review by the customer. If an NCCDS alert message does not apply to a specific customer (i.e., SIC = "0000"), the SNAS alerts all customers and makes the text of the NCCDS alert message available for review by all customers.

6.3 DAS Customer Interactions

SNAS allows customers requiring DAS services the capability to request these services via SNAS. Customers may interactively implement and access services such as Service Planning, Service Allocation, Real-Time Operations, and Service Performance Monitoring, Data Retrieval, Customer State Vector Updates, and Receipt of DAS Alerts requests.

6.4 DAS Customer Services

The SNAS provides the DAS service planning capabilities to obtain DAS services. The customer has the capability to request a report on the resource allocations available to the customer. Upon receipt of the response from the DAS, the SNAS notifies the customer and makes the response available for review.

The SNAS provides DAS service allocation capabilities. The customer has the capability to request allocation of a specified resource. It allows deletion of a pending or ongoing resource allocation. It allows modification of only a pending resource allocation. SNAS provides a list of all currently planned events and the details of the event for the customer. Upon receipt of the response from the DAS, the SNAS notifies the customer and makes the response available for review.

For real-time operations, the SNAS provides capabilities for the Customer to reconfigure the values of a specified list of parameters for an ongoing service. It allows reacquisition of the return service signal and upon receipt of the response from the DAS, the SNAS notifies the customer and makes the response available for review.

Service performance monitoring capabilities allows the customer to request that DAS user performance data be enabled or disabled. If customer performance data is enabled, the SNAS displays the data to the customer as it is received from the DAS. The SNAS receives user performance data at the rate of one DAS user performance data message per minute for each active service with ongoing DAS support.

The SNAS provides data retrieval capabilities. A search for archived data within a specified time window is available; Playback of specific archived data; Deletion of a previously playback request; and Modification of a previously playback request are also available. Upon receipt of the response from the DAS, the SNAS notifies the customer and makes the response available for review.

The SNAS provides DAS state vector update capabilities. The SNAS provides the customer with the capability to enter and transmit a state vector and upon receipt of the response from the DAS; the SNAS notifies the customer and makes the response available for review. State vectors may be imported by a customer and forwarded to DAS. Previously entered state vectors may be reentered.

DAS Alerts are displayed via SNAS. Upon receipt of a DAS alert, SNAS alerts the customer implied by the SIC specified in the DAS alert message and makes the text of the DAS alert message available for review by the customer.

If the DAS alert message does not apply to a specific customer (i.e., SIC = “0000”), the SNAS alerts all customers and make the text of the DAS alert message available for review by all customers.

This page intentionally left blank.

Section 7. Operational Scenario

This section describes the process of obtaining and providing Customer services. The customer must have previously established themselves as an NCCDS, DAS or NCCDS and DAS customer. Within SNAS, this designation allows the customer access to the services needed to obtain desired support. SICs are also assigned with this as relevant information. Whether the customer is using DAS or NCCDS on the Open IONet, the closed IONet or the Internet, initial SNAS access is similar. The Customer submits requests interactively or externally from a remote system. Once logged onto SNAS, different options and services then become available depending on customer designation of NCCDS or DAS. When utilizing either system, there is the Planning and Scheduling phase, the Real Time phase, including state vector interchanges, and the Service Performance Monitoring phase. Based on customer login information, customers can select any combination of SICs to be used in a service request from a list of SICs for which the customer is authorized.

7.1 NCCDS Operations

7.1.1 General

A SNAS customer may have several missions assigned to it. Each mission is assigned its own SIC. When a customer schedules a particular mission, this unique SIC is used to call up the associated SSC data and related parameters or to call up prototype SSCs. Regularly requested TDRS resources from pre-defined prototypes are stored and made available to the SNAS customer, allowing them to automatically generate series of add requests without having to regenerate them every time. SNAS supports both SN “Shuttle User” services as well as non-Shuttle or “Normal User” services. Services are further divided into events that are assigned SUPIDENs for each complete event. A scheduled event consists of all related services (forward link, return link, tracking and simulation or end-to-end) for a single TDRS and a single SUPIDEN for one continuous SN support period. The customer may accept and process externally generated (batch) schedule requests formatted as defined in 452-ICD-SN/CSM.

7.1.2 NCCDS Forecast Scheduling

The NCCDS forecast scheduling window is two to three weeks prior to SN support. A customer may submit scheduling request for this period. The schedule can be viewed using the schedule summary window via SNAS to confirm a customer current TDRS schedule.

SNAS automatically retrieves active period TUT data from the NCC and provides the capability for customers to request updated TUT data on demand.

The SNAS validates TDRS View and performs Orbital Constraint Checking by verifying the visibility between TDRSS and the customer platform using the TSWs and by verifying the validity of the customer communication contacts using the TSWs.

SNAS displays an alert message prior to starting any NCCDS service schedule.

7.1.3 NCCDS Active Schedules

The NCCDS active scheduling window is the following two weeks after the forecast schedule. The schedule can be viewed using the active summary window via SNAS to confirm a customer current TDRS schedule. All messages formats and definitions used to request and modify services are defined in the 452-ICD-SN/CSM, Interface Control Document between the Space Network and Customers for Service Management.

7.1.4 NCCDS Real-Time Operations and State Vector Interchanges

The Real-Time operations period is the time a service is ongoing. A customer may submit GCMRs for scheduling request changes during this period. The GCMRs available for request to apply to a service were listed in Section 6.2. UPD data may also be requested and displayed on an active service to verify service activity. SNAS will provide software 'hooks' to allow the MOC to monitor UPDs and import GCMRs.

Using a customer supplied state vector, the NCCDS (FDF) can generate a Customer ephemeris and SNAS displays the resulting visibility windows. Customer entry of latitude, longitude, and altitude or position and velocity results in generation of Type 8 (stationary) Improved Interrange Vector (IIRV) state vectors upon request. The NCCDS (FDF) also generates Type 1 (orbiting) state vectors based on customer entry of latitude, longitude, and altitude or position and velocity and forwards them to SNAS. Customers may directly enter IIRVs.

Customer defined TDRS support windows may be used to facilitate scheduling or NCCDS generation of visibility windows is an available option.

7.1.5 NCCDS Performance Monitoring

SNAS allows monitoring of NCCDS User Performance Data. NCCDS UPD data is updated by NCCDS and displayed by SNAS at the rate it is received by NCCDS. In addition to being able to view performance data during a real time event, SNAS customers may request reports of specific events, confirmed schedules, confirmed events, and activity logs.

7.2 DAS Operations

7.2.1 General

Before a new customer submits any schedule request via SNAS, certain information for that customer must be established within the DAS. Once established, a SNAS customer may have several missions assigned to it. Each mission is assigned its own SIC. When a customer schedules a particular mission, this unique SIC is used to call up the associated SSC data and related parameters. Regularly requested TDRS resources from pre-defined prototypes are stored and made available to the SNAS customer, allowing them to automatically generate series of add requests without having to regenerate them every time. DAS supports MAR, non-Shuttle or "Normal User" services only.

There are three basic types of DAS service that can be scheduled via the SNAS interface. Which type of DAS service to schedule depends upon where the customer spacecraft communications antenna are physically mounted and oriented, their RF beamwidth, and the degree of autonomous control these antennas have for pointing towards the DAS designated TDRS spacecraft. These types are “Any TDRS” Service Type, “All TDRS” Service Type, and “Specific TDRS” Service Type. More about these service types can be found in the DAS Ground Rules, November 2003. Using the “Any TDRS” Service Type, a customer MOC submits one schedule request (Resource Allocation Request), via SNAS, designating the “Any” service preference for the duration of the Projects mission support (i.e., several years), if desired. No further schedule requests should be required. The “Specific TDRS” Service Type requires the customer to specify which TDRS to use for service and logically would require that the customer has knowledge of the visibility of its spacecraft by the TDRS specified. (Note, the TDRS selected may not be available and would result in no service.)

7.2.2 DAS Pre Mission Planning

In order to access the DAS via SNAS, a customer must have previously established its project as a customer of the DAS system. A Project Service Level Agreement (PSLA) with the DAS project must have previously been established and solidified. Refer to the 453-OCD-DAS, Operations Concept Document for the Demand Access System.

Customers must undergo an SN loading and RF compatibility analysis prior to approval for using DAS service to ensure mission success. These analyses will insure adequate DAS service hardware resources and data interface bandwidth are made available since all DAS customers share these resources.

7.2.3 DAS Service Request Planning

Each DAS MAR customer resource allocation request will be preceded by Resource Planning interactions that provides the customer with the information needed to decide how best to setup a request within the context of the available DAS MAR resource times and the resource utilization objectives. This customer interaction will provide the DAS with the time window(s) in which DAS resources are requested by the customer. SNAS displays this information as Visibility Service Windows. It is the time service is available within that time window and the TDRSs available for the support. The customer can then vary parameters of their request derived from this information. Any resource conflicts are resolved based on a Spacecraft Identification Code (SIC)-based processing within the DAS and reported via SNAS.

The DAS scheduling window is 96 hrs. A customer may submit scheduling request for this period. This 96 hour schedule can be viewed using the Planned Events Request message via SNAS to confirm a customer current TDRS schedule. SNAS displays an alert message prior to starting any DAS service schedule.

7.2.4 DAS Real Time Ops and State Vector Interchanges

Using a customer supplied state vector, DAS can generate a Customer ephemeris and SNAS displays the resulting visibility windows. Customer entry of latitude, longitude, and altitude or

position and velocity results in generation of Type 8 (stationary) Improved Interrange Vector (IIRV) state vectors upon request. The DAS also generates Type 1 (orbiting) state vectors based on customer entry of latitude, longitude, and altitude or position and velocity and forwards them to DAS Customer defined TDRS support windows may be used to facilitate scheduling or DAS generation of visibility windows is an available option. DAS will notify the customer via SNAS if updated ephemeris data for the service is needed.

7.2.5 DAS Service Performance Monitoring

UPD data may be requested and displayed via SNAS. This data is used to monitor the status of the DAS service. It is updated by DAS and displayed by SNAS at the rate it is received from DAS. SNAS customers may request reports of specific events, confirmed schedules, confirmed events, and activity logs. UPD parameters of significance related to DAS data processing include Programmable Telemetry Processor or PTP data. Refer to DAS Ground Rules, November 2003 for a more thorough discussion of these UPD parameters.

Section 8. Security

The SNAS conforms to the requirements and procedures of the following:

- NASA Procedural Requirements (NPR) 2810.1, Security of Information Technology – Mission (MSN) category of NASA information, August 1999.
- Goddard Procedures and Guidelines (GPG) 2810.1, Security of Information Technology, April 2003.
- White Sands Complex (WSC) Data Services Management Center (DSMC) Security Plan, May 2002.
- IP Operational Network (IONet) Security Plan, 290-003, September 1999.
- IP Operational Network (IONet) Access Protection Policy and Requirements, 290-004).

The SNAS Security Model provides a Secure Socket Layer (SSL) protocol and digital Certificate Authority (CA) authentication. Security features coded into SNAS are defined in the Security Plan for Space Network Access System, 452-SP-SNAS.

This page intentionally left blank.

Section 9. Maintenance

9.1 Maintenance of SNAS Server and Database

The SNAS servers will be maintained through a service contract with the server hardware vendor. The interface cabling and wiring for the SNAS servers will be maintained by the SNAS operators at WSC. Maintenance of SNAS software will be performed on the SNAS developmental system, located at GSFC. As new software deliveries are required they will be distributed to the SNAS operational system from the developmental system.

9.2 Maintenance of SNAS Client

New updates to the SNAS Client will be posted to the SNAS website for download by SNAS customers. Installation of new SNAS Client software is the responsibility of the customer. Directions for download and installation of this software will also be provided on the website. If further assistance is needed, SNAS personnel may be contacted and assistance requested.

9.3 Reliability, Maintainability, Availability

SNAS Reliability, Maintainability, Availability (RMA) requirements are defined in the SNAS System Requirements Document, 452-SRD-SNAS. In order to meet these SNAS RMA requirements, the SNAS has backup capabilities. The mechanism employed to ensure this, however, is a design feature and has not been fully defined. The SNAS server has Database Sync with Backup and the SNAS Administrators have access to the system on a 24-hour basis.

If the SNAS server is out of operation, the existing DSMC software still allows for manual build operations. If the SNAS backup capabilities fail, the MOC may contact the DSMC for services. Additionally, the SNAS allows for the Scheduler to perform manual Event Build operations, and have access to the SSC's for validity.

This page intentionally left blank.

Section 10. Staffing and Training

10.1 SNAS Staffing

One operator will be assigned to monitor the operational SNAS server and database located at WSC at all times as needed. The SNAS system, to include the SNAS servers and databases, will be monitored 24 hours a day, 7 days a week. Otherwise, the SNAS is capable of unattended operations.

10.2 SNAS Training

Training of personnel to operate and monitor the operational SNAS system at WSC will be performed at delivery of the system to the site.

Training of customer personnel to operate the SNAS client may be offered upon initial use and on an as-needed basis thereafter.

This page intentionally left blank.

Abbreviations and Acronyms

AFN	Acquisition Failure Notification
ANCC	Auxiliary Network Control Center
ASAR	Alternate Schedule Add Request
BB	Bit block
CA	Certificate Authority
CCB	Configuration Control Board
CCR	Configuration Change Request
CNE	Center Network Environment
COTS	Commercial-Off-The-Shelf
DAS	Demand Access System
DCN	Document Change Notice
DSMC	Data Services Management Center
EIF	Engineering Interface
EIRP	Effective Isotropic Radiated Power
FDF	Flight Dynamics Facility
FTP	File Transfer Protocol
GCM	Ground Control Message
GCMR	Ground Control Message Request
GPG	Goddard Procedures and Guidelines
GSFC	Goddard Space Flight Center
GUI	Graphical User Interface
HP	Hewlett-Packard
HTTP	Hypertext Transfer Protocol
ICD	Interface Control Document
IIRV	Improved Inter-Range Vectors
IONet	Internet Protocol Operational Network
IP	Internet Protocol

MAR	Multiple Access Return
MOC	Mission Operations Center
MSN	Mission-Level Security
MSOCC	Multisatellite Operations Control Center
N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NCC	Network Control Center
NCCDS	Network Control Center Data System
NISN	NASA Integrated Services Network
NPR	NASA Procedural Requirements
RCTD	Return Channel Time Delay
RCTDM	Return Channel Time Delay Message
RMA	Reliability, Maintainability, and Availability
RR	Replace Request
SAR	Schedule Add Request
SDR	Schedule Delete Request
SIC	Spacecraft Identification Code
SN	Space Network
SNAS	SN Access System
SRD	System Requirements Document
SRM	Schedule Result Message
SSC	Service Specification Code
SSL	Secure Socket Layer
STDN	Spaceflight Tracking and Data Network
SWSI	Space Network Wed Services Interface
SUPIDEN	Support Identifier
TBD	To-Be-Determined
TBS	To-Be-Supplied
TCP	Transmission Control Protocol

TCP/IP	Transmission Control Protocol/Internet Protocol
TDRS	Tracking and Data Relay Satellite
TDRSS	TDRS System
TSW	TDRS Scheduling Window
TTM	Time Transfer Message
TUT	TDRS Unscheduled Time
UPD	User Performance Data
UPS	User Planning System
USM	User Schedule Message
WLR	Wait List Request
WSC	White Sands Complex

This page intentionally left blank.

Appendix A. Functional Similarities/Differences Between UPS, SWSI and SNAS

Table A-1 UPS and SWSI functions incorporated into SNAS

	Function	UPS	SWSI	SNAS
1	Process Schedule Messages	Yes	Yes	Yes
2	Process Real Time Messages	--	Yes	Yes
3	Accept external TSW Message	Yes	Yes	Yes
4	Create TSW from FDF orbital data	Yes	--	Yes
5	TDRS Unscheduled Time Message	Yes, graphically filtered on TSW	Yes, simple text list	Yes; graphically filtered on TSW
6	Support SGLT normal services	Yes	Yes	Yes
7	Support SGLT Shuttle Services	Yes	--	Yes
8	Support DAS services	--	Yes	Yes
9	Process Batch Schedule Requests	Yes	--	Yes
10	Schedule Generation engine	Yes	--	Yes
11	Schedule Conflict Resolution	Yes	--	Yes
12	Schedule Evaluation Tools	Limited	Limited	Yes; robust
13	Display Schedule Requests	Yes; graphical and textual, combined display of schedule requests/events	Yes; text only, separated into requested and confirmed windows	Yes; graphical and textual, combined display of all schedule requests/events
14	Display TSW	Yes; graphical and textual	--	Yes; graphical and textual
15	Display potential conflicts	Yes; graphical and textual	--	Yes; graphical and textual
16	Support Type-8 vectors	--	Yes	Yes
17	Support Closed IONet missions	Yes	Yes	Yes
18	Support Open IONet missions	--	Yes	Yes
19	Syntax Validation	Yes	Limited	Yes

Table A-1 UPS and SWSI functions incorporated into SNAS (cont'd)

	Function	UPS	SWSI	SNAS
20	Cross Field Validation (inter service, intra service cross checks)	Yes	Limited	Yes
21	Cross SAR Validation or Conflict Prediction (between SARs on same mission)	Yes	Yes	--
22	Message Log (Selective/Detailed Capabilities)	Yes	Yes	--
23	On Demand Request for TUT data	No	No	No
24	Hold SAR function (create SAR and don't automatically send it to SNIF)	Yes	Yes	--